Water Quality Assessment
McElmo Creek
Cortez Sanitation District and Vista Verde Village LLC WWTFs

Table of Contents

I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

Table A-1
WQA Summary

Facility Information			
Facility Name	**Permit Number**	**Design Flow (max 30-day ave, MGD)**	**Design Flow (max 30-day ave, CFS)**
F1. District's	CO0027545	1.57	2.4
F2. Vista Verde Village	CO0037702	0.03	0.046

Receiving Stream Information			
Receiving Stream Name	**Segment ID**	**Designation**	**Classification(s)**
McElmo Creek	COSJLP07a	Undesignated	Aquatic Life Warm 1 Recreation Class E Agriculture

Low Flows (cfs)			
1E3 (1-day)	**7E3 (7-day)**	**30E3 (30-day)**	**Ratio of 30E3 to the Design Flow (cfs)**
0.8	2.9	3.3	F1: 1.4:1
0	0	0	F2: 0:1

Regulatory Information					
T&E Species	**303(d) (Reg 93)**	**Monitor and Eval (Reg 93)**	**Existing TMDL**	**Temporary Modification(s)**	**Control Regulation**
No	Fe-Trec, *E.coli*	None	No	Temporary Modifications: NH_3(ac)=old TVS, NH_3(ch)=0.06(type A) Expiration date of 6/30/2014.	Reg. 39

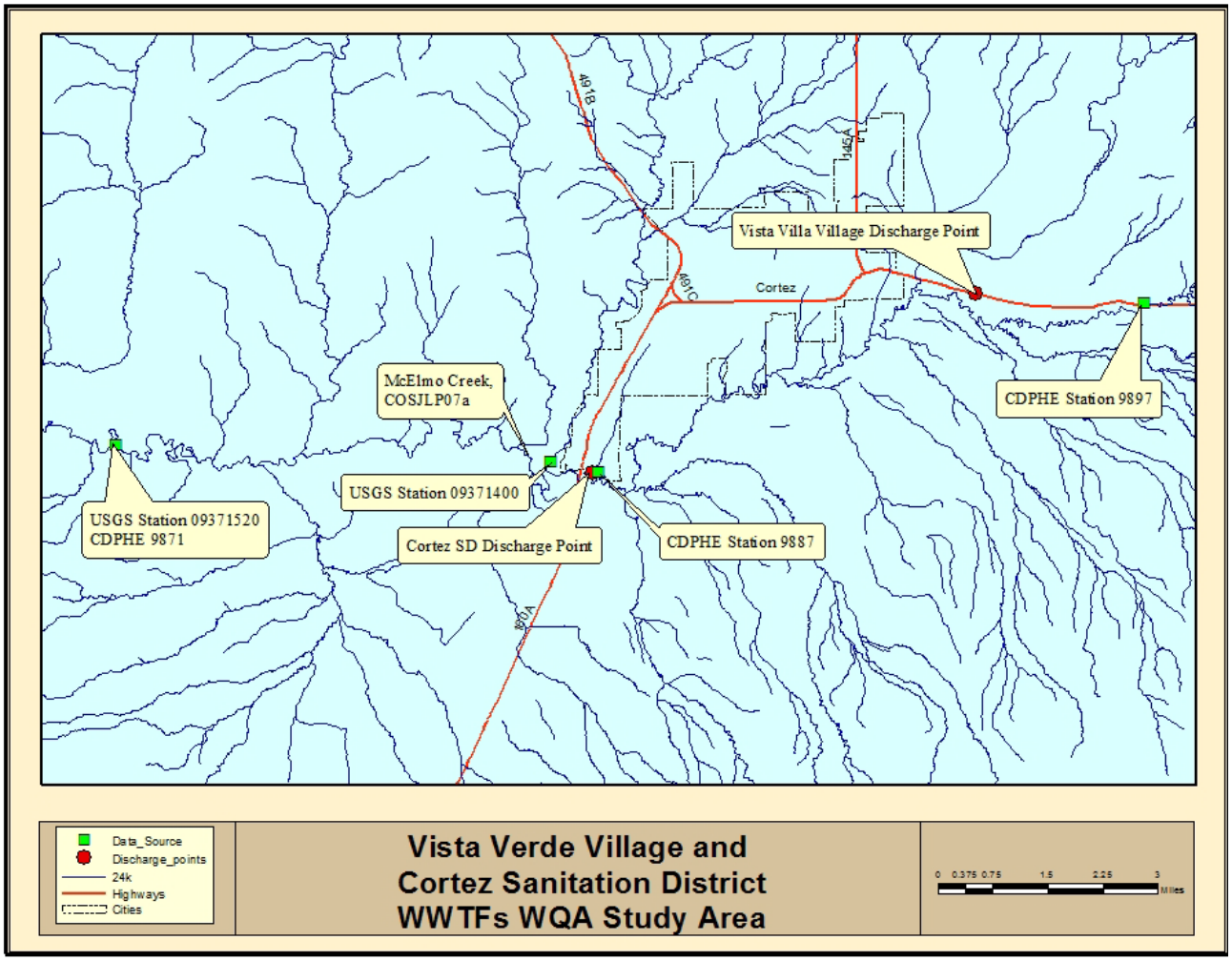
Pollutants Evaluated
F1. Ammonia, *E.coli*, TRC, Metals, Temp, Salinity F2. Ammonia, *E.coli*, TRC, Temp, Salinity

II. Introduction

The water quality assessment (WQA) of McElmo Creek near the Cortez Sanitation District's (WWTF) and Vista Verde Village (VVV) (WWTF), located in Montezuma County, is intended to determine the assimilative capacities available for pollutants found to be of concern. The Vista Verde Village WWTF is located about 7 miles upstream from the Cortez Sanitation District WWTF. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These

parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit rationale. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



These WWTFs discharge to McElmo Creek, which is stream segment COSJLP07a. This means the San Juan Basin, La Plata Sub-basin, Stream Segment 07a. This segment is composed of the "Mainstem of McElmo Creek from the source to the Colorado/Utah border, except for the specific listings in Segment 7b. Mainstem of Yellow Jacket Creek, including all tributaries, and wetlands, from the source to the confluence with McElmo Creek.". Stream segment COSJLP07a is classified for Aquatic Life Warm 1, Recreation Class E, and Agriculture.

Information used in this assessment includes data gathered from the WWTFs, Division, Colorado Division of Water Resources (DWR), U.S. Geological Survey (USGS), and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

Narrative Standards

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2 Radionuclide Standards	
Parameter	**Picocuries per Liter**
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values for both plutonium and americium.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as "interim standards" and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because the McElmo Creek is classified for Aquatic Life Warm 1, without a water supply designation, the fish ingestion, and aquatic life standards apply to this discharge.

Salinity

Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. For industrial dischargers and for the discharge of intercepted groundwater, this is a no-salt discharge requirement. However, the regulation states that this requirement may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 350 tons per year. The Division may permit the discharge of salt upon a satisfactory demonstration that it is not practicable to prevent the discharge of all salt. See Regulation

61.8(2)(l)(i)(A)(1) for industrial discharges and 61.8(2)(l)(iii) for discharges of intercepted groundwater for more information regarding this demonstration.

For municipal dischargers, an incremental increase of 400 mg/l above the flow weighted averaged salinity of the intake water supply is allowed. This may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 366 tons per year. The Division may permit the discharge of salt in excess of the 400 mg/l incremental increase, upon a satisfactory demonstration that it is not practicable to attain this limit. See Regulation 61.8(2)(l)(vi)(A)(1) for more information regarding this demonstration.

In addition, the Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3 have been assigned to stream segment COSJLP07a in accordance with the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*.

Table A-3 **In-stream Standards for Stream Segment COSJLP07a**
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9 su
E.coli chronic = 126 colonies/100 ml
Temperature March-Nov = 27.5° C MWAT and 28.6° C DM
Temperature Dec-Feb = 13.8° C MWAT and 14.3° C DM
Inorganic
Total Ammonia acute and chronic = TVS
Temporary Modification: NH_3(ac) old TVS, NH_3(ch)=0.06(Type A), Expiration date of 6/30/2014
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 100 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 7.6 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium chronic = 100 µg/l
Dissolved Trivalent Chromium acute and chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Total Recoverable Iron chronic = 2200 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 210 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and chronic = TVS
Dissolved Zinc acute and chronic = TVS
Nonylphenol acute = 28 µg/l
Nonylphenol chronic = 6.6 µg/l

Table Value Standards and Hardness Calculations

Standards for metals are generally shown in the regulations as Table Value Standards (TVS), and these often must be derived from equations that depend on the receiving stream hardness or species of fish present; for ammonia, standards are discussed further in Section IV of this WQA. The

Classification and Numeric Standards documents for each basin include a specification for appropriate hardness values to be used. Specifically, the regulations state that:

> The hardness values used in calculating the appropriate metal standard should be based on the lower 95% confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used.

The mean hardness of McElmo Creek was computed to be 1,041 mg/l based on sampling data from USGS Station 09371520 located on McElmo Creek about 6.5 miles downstream of the Cortez Sanitation District WWTF. The *Basic Standards and Methodologies for Surface Water* indicates that hardness must be capped at 400 mg/l when determining in-stream metal water quality standards using the equations in the TVS. This maximum hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for metals, with the results shown in Table A-4.

Table A-4

TVS-Based Metals Water Quality Standards for CO0027545*

Based on the Table Value Standards Contained in the Colorado Department of Public Health and Environment Water Quality Control Commission *Regulation 34*

Parameter	***In-Stream Water Quality Standard***		***TVS Formula: Hardness (mg/l) as CaCO3 =*** **400**
Cadmium, Dissolved	Acute	9.1 µg/l	$[1.136672-0.041838\ln(\text{hardness})]e^{(0.9151(\ln(\text{hardness}))-3.1485)}$
	Chronic	1.2 µg/l	$[1.101672-0.041838\ln(\text{hardness})]e^{(0.7998(\ln(\text{hardness}))-4.4451)}$
Trivalent Chromium, Dissolved	Acute	1,773 µg/l	$e^{(0.819(\ln(\text{hardness}))+2.5736)}$
	Chronic	231 µg/l	$e^{(0.819(\ln(\text{hardness}))+0.5340)}$
Hexavalent Chromium, Dissolved	Acute	16 µg/l	Numeric standards provided, formula not applicable
	Chronic	11 µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	50 µg/l	$e^{(0.9422(\ln(\text{hardness}))-1.7408)}$
	Chronic	29 µg/l	$e^{(0.8545(\ln(\text{hardness}))-1.7428)}$
Lead, Dissolved	Acute	281 µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-1.46)}]$
	Chronic	11 µg/l	$[1.46203-0.145712\ln(\text{hardness})][e^{(1.273(\ln(\text{hardness}))-4.705)}]$
Manganese, Dissolved	Acute	4,738 µg/l	$e^{(0.3331(\ln(\text{hardness}))+6.4676)}$
	Chronic	2,618 µg/l	$e^{(0.3331(\ln(\text{hardness}))+5.8743)}$
Nickel, Dissolved	Acute	1,513 µg/l	$e^{(0.846(\ln(\text{hardness}))+2.253)}$
	Chronic	168 µg/l	$e^{(0.846(\ln(\text{hardness}))+0.0554)}$
Selenium, Dissolved	Acute	18.4 µg/l	Numeric standards provided, formula not applicable
	Chronic	4.6 µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	22 µg/l	$½\ e^{(1.72(\ln(\text{hardness}))-6.52)}$
	Chronic	3.5 µg/l	$e^{(1.72(\ln(\text{hardness}))-9.06)}$
Zinc, Dissolved	Acute	467 µg/l	$0.978e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	405 µg/l	$0.986\ e^{(0.8525(\ln(\text{hardness}))+0.9109)}$

*Metals are not applicable to Vista Verde Village WWTF. However, the segment is listed on 303(d) List of Impaired Waters (see below) and therefore, a monitoring for this parameter may be added to the permit for data collection

Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List

This stream segment is on the 303(d) list of water quality impacted streams for Fe-Trec and E.coli.

For a receiving water placed on this list, the Restoration and Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocation (WLAs) to be distributed to the affected facilities. WLAs for Fe-Trec and E.coli have not yet been established and

the allowable concentration calculated in the following sections may change upon further evaluation by the Division.

IV. Receiving Stream Information

Low Flow Analysis

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

To determine the low flows available to the Cortez Sanitation District's WWTF, USGS gage station 09371520 (McElmo Creek Above Trail Canyon Near Cortez, CO) was used. This flow gage located about 6.5 miles downstream from the discharge point. Between the discharge point and the USGS station, Hartman Draw (USGS #09371400) and Alkali Canyon contribute to McElmo Creek. Therefore, to calculate the available low flows for the facility, these contributions as well as the facility discharge had to be deducted. Daily flows from the USGS Gage Station 09371520 (McElmo Creek Above Trail Canyon Near Cortez, CO) were obtained from October 22, 2002 through October 22, 2012 (provisional data from 11/14/2011 through 10/22/2012 have been excluded from the process) and the annual 1E3, 7E3 and 30E3 low flows were calculated using U.S. Environmental Protection Agency (EPA) DFLOW software.

The output from DFLOW provides calculated acute and chronic low flows for each month. Same process was repeated for USGS gage station 09371400 (Hartman Draw at Cortez, CO) with available data from 4/1/1978 through 9/30/1986. The acute low flows exceeding chronic low flows were set to chronic low flows. Then the Hartman low flows were multiplied by two to include contribution from Alkali Canyon. Resulting low flows and the maximum actual discharge from the facility deducted from the low flows of McElmo Creek to determine available low flow for the facility. In case of 1-day low flow, the low flow for March resulted in a negative number. Since the low flow cannot be negative the Division set the low flow for Hartman Creek to an average of months of February and April. Same adjustment process is repeated for 7-day chronic low flows for the months of February, March and November.

These manipulated data deemed to be best representing the upstream low flow conditions will be used in this WQA until better representing data are collected above the discharge.

Based on the low flow analysis described previously, the upstream low flows available to the District's WWTF were calculated and are presented in Table A-4a.

Table A-4a

Low Flows for McElmo Creek at the District's WWTF

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	0.8	4.1	0.8	1.6	2.8	2.9	11	11	22	12	8.4	4.8	0.8
7E3 Chronic	2.9	4.1	3.3	4.5	2.9	2.9	11	13	22	19	8.8	6.8	6.6
30E3 Chronic	3.3	4.1	3.3	4.5	4.3	4.3	13	15	22	21	11	6.8	6.8

The ratio of the low flow of McElmo Creek to the District's WWTF design flow is 1.4:1.

To determine the low flows for the Villa Verde Village WWTF, the division communicated with the local water commissioner who stated that McElmo Creek dries out leading to a zero low flow conditions (Table A-4b). This assessment is consistent with the previous WQA and the statement dated April 28, 2006, from the managing member of Vista Verde Village LLC.

Table A-4b

Low Flows for McElmo Creek at the Vista Verde Village WWTF

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	0	0	0	0	0	0	0	0	0	0	0	0	0
7E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
30E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0

The ratio of the low flow of McElmo Creek to the WWTF design flow is 0:1.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

For District's WWTF, 100% of the available assimilative capacity may be used as the previous fact sheet stated that the facility is excluded from the mixing zone study based on a stream width and depth measurements. Therefore, no mixing zone study will be required for this facility

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

To conduct an assessment of the ambient water quality upstream of the Cortez Sanitation District's WWTF, data were gathered primarily from CDPHE Station 9887 (McElmo Cr. Above Cortez SD. S.W. WWTF) located approximately immediately upstream from the facility. Data were available for a period of record from January 2001 through June 2002. Data (Copper and lead) were also collected from CDPHE Station 9897 (McElmo CR. Above Cortez @ HWY 160). These data are summarized in Table A-5a.

Table A-5a

Ambient Water Quality for McElmo Creek

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*	*Notes*
DO (mg/l)	13	7.7	9.5	12	9.6	13	5	
pH (su)	13	7.8	8.1	8.2	8	8.3	6.5-9	
E. coli (#/100 ml)	8	4	60	196	29	201	126	1
NH_3 as N, Tot (mg/l)	15	0.14	0.54	0.9	0.52	1.1	TVS	Temp Mod: 0.06 unionized
As, Dis (µg/l)	3	1	1	1	1	1	340	
Cu, Dis (µg/l)	4	0	3	7.1	3.5	8	29	2
Fe, TR (µg/l)	13	168	890	3540	2148	13000	2200	
Mn, Dis (µg/l)	13	55	190	344	220	500	2618	
Se, Dis (µg/l)	10	1.3	2.6	3.5	2.5	4.1	4.6	
Ag, Dis (µg/l)	3	0	0	0	0	0	3.5	2
Zn, Dis (µg/l)	6	100	105	125	115	170	405	
Hardness as $CaCO_3$ (mg/l)	28	609	895	1529	1041	1720	NA	

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

Note 2: When sample results were below detection levels, the value of zero was used in accordance with the Division's standard approach for summarization and averaging purposes.

To conduct an assessment of the ambient water quality upstream of the Vista Verde Village WWTF, data were gathered primarily from CDPHE Station 9897 (McElmo CR. Above Cortez @ HWY 160). These data available from February 2010 to June 2010 are summarized in Table A-5b.

Table A-5b

Ambient Water Quality for McElmo Creek

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*	*Notes*
Temp (°C)	3	7.3	21	27	17	29	NA	
DO (mg/l)	3	6.8	8.3	12	9.4	14	5	
pH (su)	3	7.5	8.2	8.3	7.9	8.3	6.5-9	
E. coli (#/100 ml)	3	9	10	177	27	249	126	1

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

V. Facility Information and Pollutants Evaluated

Facility Information

The District's WWTF is located at in the SW 1/4 of the NW 1/4 of S3, T35N, R16W; 2902 S. Broadway Cortez, CO; at 37.32217° latitude North and 108.60617° longitude West in Montezuma County. The current design capacity of the facility is 1.57 MGD (2.4 cfs). Wastewater treatment is accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity. Note that this facility is a consolidation of previous three palnts (North plant: 0.38 MGD, Southwest plant 0.255 MGD and South plant 0.9 MGD; taken directly from the facility representative).

Other nearby facility:

- Vista Verde Village Mobile Home Park WWTF (CO-0037702) (0.03 MGD), which discharges to McElmo Creek near Cortez. This facility is located approximately 7 miles upstream of the proposed Cortez WWTF. This facility is modeled with the Cortez WWTF when determining the assimilative capacities for McElmo Creek .

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit rationale.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTF.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- Total Residual Chlorine
- *E. coli*
- Ammonia (modeled together)
- Temperature
- Metals and Cyanide (Cortez Sanitation District WWTF only)
- Salinity

Based upon the size of the discharge, the lack of industrial contributors, dilution provided by the receiving stream and the fact that no unusually high metals concentrations are expected to be found in the wastewater effluent, metals are not evaluated further in this water quality assessment for VVV WWTF.

It is the Division's standard procedure to consider metals and cyanide as potential pollutants of concern for all major domestic WWTFs (i.e. Cortez Sanitation District's WWTF).

According to the *Rationale for Classifications, Standards and Designations of the San Juan*, stream segment COSJLP07a is not designated a water supply because "There are currently no drinking water supply intakes or domestic groundwater wells under the influence of surface water identified in this segment. For this reason, the nitrate standard, which is applied at the point of intake to a water supply, is not evaluated as part of this analysis.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

Technical Information

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter, will be compared to other potential limitations (federal Effluent Limitations Guidelines, State Effluent Limitations, or other applicable limitation) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of McElmo Creek near the District's WWTF for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL

M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

The upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For metals in the total or total recoverable form, existing quality is determined to be the 50th percentile. For pathogens such as fecal coliform and *E. coli*, existing quality is determined to be the geometric mean.

For temperature, the highest 7-day mean (for the chronic standard) of daily average stream temperature, over a seven consecutive day period will be used in calculations of the chronic temperature assimilative capacity, where the daily average temperature should be calculated from a minimum of three measurements spaced equally through the day. The highest 2-hour mean (for the acute standard) of stream temperature will be used in calculations of the acute temperature assimilative capacity. The highest 2-hour mean should be calculated from a minimum of 12 measurements spaced equally through the day.

No modeling together of the Cortez and VVV facilities has been performed in this WQA except for ammonia.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for were calculated. The data used and the resulting WQBELs, M_2, are set forth in Table A-6a for the chronic WQBELs and A-6b for the acute WQBELs for Cortez Sanitation District WWTF. Similarly, the WQBELS are presented in Table A-6c for the chronic WQBELs and A-6d for the acute WQBELs for VVV WWTF.

Where a WQBEL is calculated to be a negative number and interpreted to be zero, the Division standard procedure is to allocate the water quality standard to prevent further degradation of the receiving waters.

Chlorine: There are no point sources discharging total residual chlorine within one mile of the WWTFs. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

***E. coli*:** There are no point sources discharging *E.coli* within one mile of the WWTFs. Thus, WQBELs were evaluated separately. In the absence of *E. coli* ambient water quality data, fecal coliform ambient data are used as a conservative estimate of *E. coli* existing quality. For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature: This is a zero low flow stream for VVV WWTF and therefore, in accordance with the Division's Temperature Policy, no temperature limitations are required.

The Cortez Sanitation District WWTF is not exempted from the temperature requirements. However, a WQBEL for temperature can only be calculated if there is representative data, in the proper form, to determine what the background Maximum Weekly Average Temperature and Daily Maximum ambient temperatures are. As this data is not available at this time, the temperature limitation will be set at the water quality standard and will be revisited in the future when representative temperature data becomes available.

Table A-6a

Chronic WQBELs

Parameter	Q_1 *(cfs)*	Q_2 *(cfs)*	Q_3 *(cfs)*	M_1	M_3	M_2	*Notes*
E.coli (#/100 ml)	3.3	2.4	5.7	29	126	***259***	
TRC (mg/l)	3.3	2.4	5.7	0	0.011	***0.026***	
As, TR (µg/l)	3.3	2.4	5.7	0	7.6	***18***	
Cd, Dis (µg/l)	3.3	2.4	5.7	0	1.2	***2.9***	
Cr+3, TR (µg/l)	3.3	2.4	5.7	0	100	***238***	
Cr+3, Dis (µg/l)	3.3	2.4	5.7	0	231	***549***	
Cr+6, Dis (µg/l)	3.3	2.4	5.7	0	11	***26***	
Cu, Dis (µg/l)	3.3	2.4	5.7	7.1	29	***59***	
Fe, TR (µg/l)	3.3	2.4	5.7	890	2200	***4001***	
Pb, Dis (µg/l)	3.3	2.4	5.7	0	11	***26***	
Mn, Dis (µg/l)	3.3	2.4	5.7	344	2618	***5745***	
Hg, Tot (µg/l)	3.3	2.4	5.7	0	0.01	***0.024***	
Hg, Dis (µg/l)	3.3	2.4	5.7	0	NA	***NA***	
Ni, Dis (µg/l)	3.3	2.4	5.7	0	168	***399***	
Se, Dis (µg/l)	3.3	2.4	5.7	3.5	4.6	***6.1***	
Ag, Dis (µg/l)	3.3	2.4	5.7	0	3.5	***8.3***	
Zn, Dis (µg/l)	3.3	2.4	5.7	125	405	***790***	
Nonylphenol (µg/l)	3.3	2.4	5.7	0	6.6	***6.6***	

Table A-6b

Acute WQBELs

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2	*Notes*
Temp Daily Max (°C) March-Nov	0.8	2.4	3.2	NA	28.6	***28.6***	
Temp Daily Max (°C) Dec-Feb	0.8	2.4	3.2	NA	14.3	***14.3***	
E.coli (#/100 ml)	chronic * 2					***518***	
TRC (mg/l)	0.8	2.4	3.2	0	0.019	***0.025***	
Nitrate as N (mg/l)	0.8	2.4	3.2	0	100	***133***	
As, Dis (µg/l)	0.8	2.4	3.2	1	340	***453***	
Cd, Dis (µg/l)	0.8	2.4	3.2	0	9.1	***12***	
Cr+3, Dis (µg/l)	0.8	2.4	3.2	0	1,773	***2,364***	
Cr+6, Dis (µg/l)	0.8	2.4	3.2	0	16	***21***	
Cu, Dis (µg/l)	0.8	2.4	3.2	7.1	50	***64***	
CN, Free (µg/l)	0.8	2.4	3.2	0	5	***6.7***	
Pb, Dis (µg/l)	0.8	2.4	3.2	0	281	***375***	
Mn, Dis (µg/l)	0.8	2.4	3.2	344	4,738	***6,203***	
Ni, Dis (µg/l)	0.8	2.4	3.2	0	1,513	***2,017***	
Se, Dis (µg/l)	0.8	2.4	3.2	3.5	18.4	***23***	
Ag, Dis (µg/l)	0.8	2.4	3.2	0	22	***29***	
Zn, Dis (µg/l)	0.8	2.4	3.2	125	467	***581***	
Nonylphenol (µg/l)	0.8	2.4	3.2	0	28	***28***	

Table A-6c

Chronic WQBELs

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2	*Notes*
E.coli (#/100 ml)	0	0.046	0.046	27	126	126	
TRC (mg/l)	0	0.046	0.046	0	0.011	0.011	

Table A-6d

Acute WQBELs

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2	*Notes*
E.coli (#/100 ml)	chronic * 2					***252***	
TRC (mg/l)	0	0.046	0.046	0	0.019	0.019	

Ammonia: In this WQA only Ammonia Toxicity (AMMTOX) Model will be implemented even though there is a temporary modification for ammonia requiring CAM model. However, in the statement of basis (September 2012), the Water Quality Control Commission stated that "Temporary

modifications were added or extended for existing discharges to these segments, based upon evidence that the dischargers could not meet water quality based effluent limits for ammonia. The Commission's intent is to preserve the status quo during the term of the temporary modification. Existing discharges to these segments shall continue to be authorized to discharge ammonia at their current permitted concentration and flow levels, including a "report only" value. The Division will work with the existing dischargers to determine whether the table value standard for ammonia is necessary to protect the aquatic life uses of these segments. The uncertainty in the standard for each segment may be resolved through a site-specific standard or a discharger specific variance. The Commission does not intend that temporary modifications set at "current condition" will apply to new or expanded facilities. The progress on resolving the uncertainty with the ammonia standards will be reviewed in the annual Temporary Modification hearing in December 2013.".

For the facilities, the Division will implement the CAM model based limitations included the previous permits (Tables A-8a and c) until the expiration of the temporary modification and not recalculate CAM based limitations. After the expiration of the Temporary modification for ammonia, the Division will implement AMMTOX based ammonia limitations as calculated in this section.

The AMMTOX model is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for the McElmo Creek based on a study conducted by Cortez Sanitation District. The data, reflecting a period of record from December 2001 through November 2002, were used to establish the setpoint and average headwater conditions in the AMMTOX. Effluent temperature data were also available from the Cortez Sanitation District study and were used to establish the average facility contributions in the AMMTOX. Monthly effluent pH for Cortez Sanitation District WWTF was summarized from the DMRs.

Effluent pH data were also available from the VVV facility DMRs and used in this analysis to establish the average facility contributions in the AMMTOX model.

There were no temperature data available for the VVV discharges. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for pH and temperature compiled from similar facilities and receiving waters.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the District's WWTF are presented in Table A-8a and Table A-8b for the Cortez Sanitation District WWTF and in Table A-8c and Table A-8d for the VVV WWTF.

Table A-8a

Current Conditions for Ammonia based on CAM
Temporary Standards Effective Through 6/30/2014
at the Cortez Sanitation District WWTF

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	15	Report
February	16	Report
March	14	Report
April	14	Report
May	11	Report
June	11	Report
July	10	Report
August	9.5	Report
September	11	Report
October	14	Report
November	12	Report
December	13	Report

Table A-8b

AMMTOX Results for McElmo Creek
Effective Beginning 7/1/2014 at the Cortez Sanitation District WWTF

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	19	28
February	18	35
March	17	31
April	13	50
May	13	64
June	18	70
July	18	90
August	24	80
September	33	90
October	28	40
November	20*	20
December	24	36

*set to acute limitation

Table A-8c

Current Conditions for Ammonia based on CAM
Temporary Standards Effective Through 6/30/2014
at the VVV WWTF

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	Report	Report
February	Report	Report
March	Report	Report
April	32.1	Report
May	24	Report
June	Report	Report
July	Report	Report
August	Report	Report
September	29.4	Report
October	29.4	Report
November	Report	Report
December	Report	Report

Table A-8d

AMMTOX Results for McElmo Creek
Effective Beginning 7/1/2014
at the VVV WWTF

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	1.6	5.1
February	1.7	5.0
March	1.3	4.4
April	1.5	5.1
May	1.3	5.0
June	1.0	5.6
July	1.0	5.5
August	1.0	5.6
September	1.0	5.1
October	1.2	5.5
November	1.2	4.5
December	1.6	5.1

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do

not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*, stream segment COSJLP07a is Undesignated. Thus, an antidegradation review is required for this segment if new or increased impacts are found to occur.

Introduction to the Antidegradation Process

The antidegradation process conducted as part of this water quality assessment is designed to determine if an antidegradation review is necessary and if necessary, to complete the required calculations to determine the limits that can be selected as the antidegradation-based effluent limit (ADBEL), absent further analyses that must be conducted by the facility.

As outlined in the *Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance* (AD Guidance), the first consideration of an antidegradation evaluation is to determine if new or increased impacts are expected to occur. This is determined by a comparison of the newly calculated WQBELs verses the existing permit limitations in place as of September 30, 2000, and is described in more detail in the analysis. Note that the AD Guidance refers to the permit limitations as of September 30, 2000 as the existing limits.

If a new or increased impact is found to occur, then the next step of the antidegradation process is to go through the significance determination tests. These tests include: 1) bioaccumulative toxic pollutant test; 2) temporary impacts test; 3) dilution test (100:1 dilution at low flow) and; 4) a concentration test.

As the determination of new or increased impacts, and the bioaccumulative and concentration significance determination tests require more extensive calculations, the Division will begin the antidegradation evaluation with the dilution and temporary impact significance determination tests. These two significance tests may exempt a facility from further AD review without the additional calculations.

Note that the antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the antidegradation review; however, where there is only an acute standard, the acute standard should be used. The appropriate standards are used in the following antidegradation analysis.

Significance Tests for Temporary Impacts and Dilution

The ratio of the chronic (30E3) low flow to the design flow for Cortez Sanitation District WWTF is 1.4:1, and is less than the 100:1 significance criteria. The ratio of the chronic (30E3) low flow to the design flow for VVV WETF is 0:1, and is less than the 100:1 significance criteria. Therefore these facilities are not exempt from an AD evaluation based on the dilution significance determination test, and the AD evaluation must continue.

For the determination of a new or increased impact and for the remaining significance determination tests, additional calculations are necessary. Therefore, at this point in the antidegradation evaluation,

the Division will go back to the new or increased impacts test. If there is a new or increased impact, the last two significance tests will be evaluated.

New or Increased Impact and Non Impact Limitations (NILs)

To determine if there is a new or increased impact to the receiving water, a comparison of the new WQBEL concentrations and loadings verses the concentrations and loadings as of September 30, 2000, needs to occur. If either the new concentration or loading is greater than the September 2000 concentration or loading, then a new or increased impact is determined. If this is a new facility (commencement of discharge after September 30, 2000) it is automatically considered a new or increased impact.

Note that the AD Guidance document includes a step in the New or Increased Impact Test that calculates the Non-Impact Limit (NIL). The permittee may choose to retain a NIL if certain conditions are met, and therefore the AD evaluation for that parameter would be complete. As the NIL is typically greater than the ADBAC, and is therefore the chosen limit, the Division will typically conclude the AD evaluation after determining the NIL. Where the NILs are very stringent, or upon request of a permittee, the Division will calculate both the NIL and the AD limitation so that the limitations can be compared and the permittee can determine which of the two limits they would prefer, one which does not allow any increased impact (NIL), or the other which allows an insignificant impact (AD limit).

The non impact limit (NIL) is defined as the limit which results in no increased water quality impact (no increase in load or limit over the September 2000 load or limit). The NIL is calculated as the September 2000 loading, divided by the new design flow, and divided by a conversion factor of 8.34. If there is no change in design flow, then the NIL is equal to the September 2000 permit limitation.

If the facility was in place, but did not have a limitation for a particular parameter in the September 2000 permit, the Division may substitute an implicit limitation. Consistent with the First Update to the AD Guidance of April 2002, an implicit limit is determined based on the approach that specifies that the implicit limit is the maximum concentration of the effluent from October 1998 to September 2000, if such data is available. If this data is unavailable, the Division may substitute more recent representative data, if appropriate, on a case by case basis. Note that if there is a change in design flow, the implicit limit/loading is subject to recalculation based on the new design flow. For parameters that are undisclosed by the permittee, and unknown to the Division to be present, an implicit limitation may not be recognized.

The Cortez Sanitation District WWTF facility was in place as a discharger prior to September 30, 2000, and therefore the new or increased impacts test must be conducted. As the design flow of this facility has changed, the equations for the NIL calculations are shown below.

The VVV WWTF facility was also in place as a discharger prior to September 30, 2000, and therefore the new or increased impacts test must be conducted. As the design flow for this facility is the same as it was in September 2000, the NILs are equal to the permit limitations as of September 2000.

For total residual chlorine, total ammonia and E.coli (0.32 times fecal coliform), the limitations as of September 2000 were used in the evaluation of new or increased impacts for the Cortez Sanitation District WWTF.

As for the VVV WWTF, for total residual chlorine, total ammonia and E.coli (0.32 times fecal coliform), the limitations as of September 2000 were used in the evaluation of new or increased impacts. NO other parameters were considered for this facility.

Calculation of Loadings for New or Increased Impact Test

The equations for the loading calculations are given below. Note that the AD requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the AD review; however, where there is only an acute standard, the acute standard should be used. Thus, the chronic low flows will be used later in this AD evaluation for all parameters with a chronic standard, and the acute low flows will be used for those parameters with only an acute standard.

$$\textit{Previous permit load} = M_{permitted}\ (mg/l) \times Q_{permitted}\ (mgd) \times 8.34$$
$$\textit{New WQBELs load} = M_2\ (mg/l) \times Q_2\ (mgd) \times 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit (or implicit limit) **(mg/l)**
$Q_{permitted}$ = design flow as of September 2000 **(mgd)**
Q_2 = current design flow (same as used in the WQBEL calculations)
M_2 = new WQBEL concentration **(mg/l)**
8.34 = unit conversion factor

Table A-9a and b shows the results of these calculations and the determination of a new or increased impact for Cortez Sanitation District WWTF and VVV WWTF, respectively.

Calculation of Non-Impact Limitations

The total design flow of Cortez Sanitation District facilities as of September 30, 2000 was 1.505 (North plant: 0.38 MGD, Southwest plant 0.255 MGD and South plant 0.9 MGD; taken directly from the facility representative). The new design flow of this facility is 1.57. To determine if new or increased impacts are to occur, the September 2000 permit concentrations need to be adjusted for this new design flow. The equations are shown below.

$$\textit{September 2000 permit load} = M_{permitted} \times Q_{permitted} \times 8.34$$
$$\textit{Non Impact Limit (NIL)} = \textit{September 2000 permitted load} \div \textit{New Design Flow} \div 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit or implicit limit **(mg/l)**
$Q_{permitted}$ = September 2000 design flow **(mgd)**
Q_2 = new or current design flow **(mgd)**
8.34 = Unit conversion factor

Table A-9a and b shows the results of these calculations and the determination of a new or increased impact.

Table A-9a

Determination of New or Increased Impacts for Cortez Sanitation District WWTF

Pollutant	*Sept 2000 Permit Limit*	*Sept 2000 Permit Load (lbs/day)*	*NIL*	*New WQBEL*	*New WQBEL Load (lbs/day)*	*New or Increased Impact*
E.coli (#/100 ml)	64	803	61	259	3391	Yes
TRC (mg/l)	0.053	0.67	0.05	0.026	0.34	No
NH_3, Tot (mg/l) Jan	8.7	109	8.3	19	249	Yes
NH_3, Tot (mg/l) Feb	7.0	88	6.7	18	236	Yes
NH_3, Tot (mg/l) Mar	4.1	51	3.9	17	223	Yes
NH_3, Tot (mg/l) Apr	7.0	88	6.7	13	174	Yes
NH_3, Tot (mg/l) May	7.1	89	6.8	13	173	Yes
NH_3, Tot (mg/l) Jun	5.0	63	4.8	18	242	Yes
NH_3, Tot (mg/l) Jul	4.1	51	3.9	18	233	Yes
NH_3, Tot (mg/l) Aug	2.7	34	2.6	24	314	Yes
NH_3, Tot (mg/l) Sep	2.5	31	2.4	33	432	Yes
NH_3, Tot (mg/l) Oct	2.1	26	2.0	28	367	Yes
NH_3, Tot (mg/l) Nov	2.8	35	2.7	20	262	Yes
NH_3, Tot (mg/l) Dec	7.9	99	7.6	24	314	Yes
As, TR (µg/l)	NA	NA	1	18	0.24	Yes
As, Dis (µg/l)	NA	NA	1	453	5.9	Yes
Cd, Dis (µg/l)	NA	NA	0.14	2.9	0.038	Yes
Cr+3, TR (µg/l)*	NA	NA	2	238	3.1	Yes
Cr+3, Dis (µg/l)*	NA	NA	2	549	7.2	Yes
Cr+6, Dis (µg/l)*	NA	NA	2	26	0.34	Yes
Cu, Dis (µg/l)	NA	NA	62.5	59	0.77	No
CN, Free (µg/l)	NA	NA	NA	6.7	0.088	Yes
Fe, TR (µg/l)	NA	NA	125	4001	52	Yes
Pb, Dis (µg/l)	NA	NA	6.8	26	0.34	Yes
Mn, Dis (µg/l)	NA	NA	15	5745	75	Yes
Hg, Tot (µg/l)	NA	NA	0.2	0.024	0.00031	No
Ni, Dis (µg/l)	NA	NA	7.3	399	5.2	Yes
Se, Dis (µg/l)	NA	NA	2	6.1	0.08	Yes
Ag, Dis (µg/l)	NA	NA	0.03	8.3	0.11	Yes
Zn, Dis (µg/l)	NA	NA	83	790	10	Yes

Note that loading for *E.coli* cannot be calculated; but, for comparison purposes, the approach is sufficient.

*Cr, TR was used

As shown in Table A-9a, there are no new or increased impacts to the receiving stream based on the new WQBELS for TRC, copper and mercury and for these parameters the AD evaluation is complete and the WQBELs are the final result of this WQA.

For all other paramaters, there are new or increased impacts and in accordance with regulation, the permittee has the option of choosing either the NIL's or ADBAC's. Normally, the Division would assign the NILs as permit limitations, or prescribe monitoring to determine the appropriate implicit limitations as necessary, however, in this case, the NILs are very stringent and therefore the Division will automatically calculate the ADBACs for comparison.

The final two significance determination tests (bioaccumulative and concentration) need to be applied, to determine if AD limits are applicable. For the bioaccumulative test, the determination of the baseline water quality (BWQ), the baseline water quality loading (BWQload), the threshold load (TL) and the threshold load concentration (TL conc) needs to occur. For the concentration test, the BWQ, significant concentration thresholds (SCT) and antidegradation based average concentrations (ADBACs) need to be calculated. These calculations are explained in the following sections, and each significance determination test will be performed as the necessary calculations are complete. The AD low flow may also need to be calculated when determining the BWQ for an existing discharger (as of Sept 2000) when upstream water quality data are used. The 2000 limits for VVV facility the Division used the calculated ammonia limitations that were in the old WQA.

Table A-9b

Determination of New or Increased Impacts for VVV WWTF

Pollutant	***Sept 2000 Permit Limit***	***Sept 2000 Permit Load (lbs/day)***	***NIL***	***New WQBEL***	***New WQBEL Load (lbs/day)***	***New or Increased Impact***
E.coli (#/100 ml)	1024	256	1024	126	32	No
TRC (mg/l)	0.1	0.025	0.1	0.011	0.0028	No
NH_3, Tot (mg/l) Jan	186	47	186	1.6	0.4	No
NH_3, Tot (mg/l) Feb	190	48	190	1.7	0.43	No
NH_3, Tot (mg/l) Mar	249	62	249	1.3	0.33	No
NH_3, Tot (mg/l) Apr	32.1	8	32.1	1.5	0.37	No
NH_3, Tot (mg/l) May	24	6	24	1.3	0.32	No
NH_3, Tot (mg/l) Jun	57	14	57	1.0	0.25	No
NH_3, Tot (mg/l) Jul	143	36	143	1.0	0.25	No
NH_3, Tot (mg/l) Aug	55	14	55	1.0	0.25	No
NH_3, Tot (mg/l) Sep	29.4	7.4	29.4	1.0	0.25	No
NH_3, Tot (mg/l) Oct	29.4	7.4	29.4	1.2	0.3	No
NH_3, Tot (mg/l) Nov	55	14	55	1.2	0.3	No
NH_3, Tot (mg/l) Dec	158	40	158	1.6	0.4	No

As shown in Table A-9b, there are no new or increased impacts to the receiving stream based on the new WQBELS, and therefore the AD evaluation is complete, and AD limitations are not necessary. The WQBELs are the final result of this WQA.

Determination of Baseline Water Quality (BWQ)

The BWQ is the ambient condition of the water quality as of September 30, 2000. The BWQ defines the baseline low flow pollutant concentration, and for bioaccumulative toxic pollutants, the baseline load. The BWQ is to take into account the influence of the discharger if the discharge was in place prior to September 30, 2000. In such a case, data from a downstream location should be used to determine the BWQ. If only upstream data is available, then a mass balance equation may be applied, using the facilities effluent data to determine the BWQ. If the discharge was not present prior to September 30, 2000, then the influence of that discharge would not be taken into account in determining the BWQ. If the BWQ has already been determined in a previous WQA AD evaluation, it may not need to be recalculated as the BWQ is the water quality as of September 30, 2000, and therefore should not change unless additional data is obtained or the calculations were in error.

This discharger was in place as of September 30, 2000, and therefore the BWQ will include the influence of the discharger. Data collected at CDPHE Station #9871 (McElmo Cr. ABV TRAIL CANYON @GAGE), located approximately 6.5 miles downstream from the District's WWTF, were determined to be representative of fully mixed condition downstream from the facility, without other influences, and thus the data were used to determine the BWQ concentrations. Since the data were collected downstream of the discharge, it takes into account the contribution of the facility.

Currently, it is the Division's approach to evaluate five years of ambient water quality data, if available, for the five years prior to September 30, 2000, when determining the BWQ. Data from this location were available for a period of record of June 1998 through August 2000 for the following pollutants: fecal coliform (*E.coli*), dis As, dis Cd. TR Cr (all Crs), dis Cu, Tr Fe, dis Pb, dis Mn, dis Ni, dis Se, dis Ag and dis Zn.

The ambient water quality data are summarized in Table A-10a. The BWQ concentrations based on these data, represented by the 50^{th} percentile for total recoverable metals and total metals, the geometric mean for coliforms, and the 85^{th} percentile for dissolved metals and other pollutants, are summarized in Table A-10b.

Table A-10a

Ambient Water Quality Data Summary for AD Period

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Location*
Fecal Coliform (#/100 ml)	14	1	84	492	43	Downstream
E.coli (#/100 ml)	14	0.32	27	157	14	Downstream
As, Dis (µg/l)	13	0	0	1.0	0.39	Downstream
Cd, Dis (µg/l)	14	0	0	0	0	Downstream
Cr, TR (µg/l)	2	1.0	3.4	5.8	3.4	Downstream
Cr, Dis (µg/l)	2	0	0	0	0	Downstream
Fe, TR (µg/l)	14	336	2,050	7,630	3,399	Downstream
Pb, Dis (µg/l)	14	0	0	0	0	Downstream
Mn, Dis (µg/l)	14	8.6	30	202	93	Downstream
Hg, Tot (µg/l)	14	0	0	0	0	Downstream
Ni, Dis (µg/l)	2	0.42	1.4	2.4	1.4	Downstream
Se, Dis (µg/l)	14	1.8	2	5.0	3	Downstream
Ag, Dis (µg/l)	14	0	0	0	0	Downstream
Zn, Dis (µg/l)	13	0	0	49	25	Downstream

Table A-10b

BWQ Concentrations for Potential Pollutants of Concern Based on Downstream Ambient Water Quality Concentrations

Pollutant	*BWQ*	*WQS*
E.coli (#/100 ml)	14	126
As, Dis (µg/l)	1.0	340
Cd, Dis (µg/l)	0	1.2
Cr+3, TR (µg/l)	3.4	100
Cr+3, Dis (µg/l)	3.4	231
Cr+6, Dis (µg/l)	3.4	11
CN, Free (µg/l)	0	5
Fe, TR (µg/l)	2050	2200
Pb, Dis (µg/l)	0	11
Mn, Dis (µg/l)	202	2,618
Ni, Dis (µg/l)	2.4	168
Se, Dis (µg/l)	5.0	4.6
Ag, Dis (µg/l)	0	3.5
Zn, Dis (µg/l)	49	405

In cases where the BWQ concentration exceeds the water quality standard, the calculated BWQ concentration must then be set equal to the water quality standard. This occurred for total recoverable iron and dissolved selenium.

Note that the AD requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the antidegradation review; however, where there is only an acute standard, the acute standard should be used. Chronic standards were available for all pollutants.

For ammonia, BWQ concentrations for total ammonia are calculated by incorporating the average effluent concentrations and average flow, and the ambient water quality and low flows for the antidegradation period into the AMMTOX model and determining the maximum ammonia concentration downstream. For this calculation the BWQ has been taken as zero.

Bioaccumulative Significance Test

Parameters associated with the bioaccumulative significance test are not parameters of concern for this facility. This section is therefore omitted.

Significant Concentration Threshold

The SCT is defined as the BWQ plus 15% of the baseline available increment (BAI), and is calculated by the following equation:

$$SCT = (0.15 \times BAI) + BWQ$$

The BAI is the concentration increment between the baseline water quality and the water quality standard, expressed by the term (WQS – BWQ). Substituting this into the SCT equation results in:

$$SCT = 0.15 \times (WQS-BWQ) + BWQ$$

Where,

WQS = Chronic standard or, in the absence of a chronic standard, the acute standard
BWQ = Value from Table A-10b

The AMMTOX model is used to determine the SCTs for ammonia. Because the new ammonia standard is based on a function of the pH and temperature of the receiving stream, the WQS changes moving downstream from a discharge point. The BWQ and the SCT also change moving downstream. The AMMTOX model calculates these values for every tenth of a mile, for up to 20 miles. Therefore, it is impractical to show the SCTs for every part of the stream for all 12 months. These values are available in the AMMTOX model, if requested.

Determination of the Antidegradation Based Average Concentrations

Antidegradation based average concentrations (ADBACs) are determined for all parameters except ammonia, by using the mass-balance equation, and substituting the SCT in place of the water quality standard, as shown in the following equation:

$$ADBAC = \frac{SCT \times Q_3 - M_1 \times Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3 based on either the chronic or acute standard)
Q_2 = Current design capacity of the facility
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = Current ambient water quality concentration (From Section III)
SCT = Significant concentration threshold

The ADBACs were calculated using the SCTs, and are set forth in Table A-11a.

ADBACs for total ammonia are calculated by substituting the SCT in place of the chronic standard in the AMMTOX model, which generates monthly ADBACs as shown in Table A-11b.

Table A-11a
SCTs and ADBACs

Pollutant	***Q_1(cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***SCT***	***ADBAC***
E.coli (#/100 ml)	3.3	2.4	5.7	29	31	34
As, TR (µg/l)	3.3	2.4	5.7	0	1.1	2.6
As, Dis (µg/l)	0.8	2.4	3.2	1	52	69
Cd, Dis (µg/l)	3.3	2.4	5.7	0	0.18	0.43
Cr+3, TR (µg/l)	3.3	2.4	5.7	0	18	43
Cr+3, Dis (µg/l)	3.3	2.4	5.7	0	38	90
Cr+6, Dis (µg/l)	3.3	2.4	5.7	0	4.5	11
CN, Free (µg/l)	0.8	2.4	3.2	0	0.75	1
Fe, TR (µg/l)	3.3	2.4	5.7	890	1180	1579
Pb, Dis (µg/l)	3.3	2.4	5.7	0	1.7	4
Mn, Dis (µg/l)	3.3	2.4	5.7	344	564	867
Ni, Dis (µg/l)	3.3	2.4	5.7	0	27	64
Se, Dis (µg/l)	3.3	2.4	5.7	3.5	4.6	6.1
Ag, Dis (µg/l)	3.3	2.4	5.7	0	0.53	1.3
Zn, Dis (µg/l)	3.3	2.4	5.7	125	102	70

Based on these calculations, the current ambient water quality exceeds the SCT for copper and zinc. Where an assimilative capacity is calculated to be less than the standard, the Division standard procedure is to allocate the water quality standard, which in this case is the SCT, to prevent degradation of the receiving stream.

Table A-11b ADBACs for Ammonia	
Pollutant	***Monthly ADBAC***
NH_3, Total (mg/l) Jan	2.9
NH_3, Total (mg/l) Feb	2.7
NH_3, Total (mg/l) Mar	2.6
NH_3, Total (mg/l) Apr	2.0
NH_3, Total (mg/l) May	1.9
NH_3, Total (mg/l) Jun	2.8
NH_3, Total (mg/l) Jul	2.7
NH_3, Total (mg/l) Aug	3.6
NH_3, Total (mg/l) Sep	5.0
NH_3, Total (mg/l) Oct	4.2
NH_3, Total (mg/l) Nov	3.2
NH_3, Total (mg/l) Dec	3.6

Concentration Significance Tests

The concentration significance determination test considers the cumulative impact of the discharges over the baseline condition. In order to be insignificant, the new or increased discharge may not increase the actual instream concentration by more than 15% of the available increment over the baseline condition. The insignificant level is the ADBAC calculated in Tables A-11a and A-11b above. If the new WQBEL concentration (or potentially the TL Conc for bioaccumulatives) is greater than the ADBAC, an AD limit would be applied. This comparison is shown in Tables A-12a and A-12b (for ammonia).

Table A-12a

Concentration Significance Test

Pollutant	***New WQBEL***	***ADBAC***	***Concentration Test Result***
E.coli (#/100 ml)	259	34	Significant
As, TR (µg/l)	18	2.6	Significant
As, Dis (µg/l)	453	69	Significant
Cd, Dis (µg/l)	2.9	0.43	Significant
Cr+3, TR (µg/l)	238	43	Significant
Cr+3, Dis (µg/l)	549	90	Significant
Cr+6, Dis (µg/l)	26	11	Significant
CN, Free (µg/l)	6.7	1.0	Significant
Fe, TR (µg/l)	4001	1579	Significant
Pb, Dis (µg/l)	26	4.0	Significant
Mn, Dis (µg/l)	5745	867	Significant
Ni, Dis (µg/l)	399	64	Significant
Se, Dis (µg/l)	6.1	6.1	Insignificant
Ag, Dis (µg/l)	8.3	1.3	Significant
Zn, Dis (µg/l)	790	70	Significant

Table A-12b Concentration Significance Test for Ammonia			
Pollutant	***New WQBEL***	***ADBAC***	***Concentration Test Result***
NH3, Total (mg/l) Jan	19	2.9	Significant
NH3, Total (mg/l) Feb	18	2.7	Significant
NH3, Total (mg/l) Mar	17	2.6	Significant
NH3, Total (mg/l) Apr	13.3	2.0	Significant
NH3, Total (mg/l) May	13.2	1.9	Significant
NH3, Total (mg/l) Jun	18.5	2.8	Significant
NH3, Total (mg/l) Jul	17.8	2.7	Significant
NH3, Total (mg/l) Aug	24	3.6	Significant
NH3, Total (mg/l) Sep	33	5.0	Significant
NH3, Total (mg/l) Oct	28	4.2	Significant
NH3, Total (mg/l) Nov	20	3.2	Significant
NH3, Total (mg/l) Dec	24	3.6	Significant

For Dis Selenium, the WQBEL is equal to/less than the ADBAC and therefore, the concentration test results is an insignificant determination. The WQBEL is the final result of this WQA for this parameter and AD limitations are not necessary.

For the rest of the parameters, the WQBELs are greater than the ADBACs and therefore, the concentration test results in a significance determination, and the antidegradation based effluent limitations (ADBELs) must be determined.

Antidegradation Based Effluent Limitations (ADBELs)

The ADBEL is defined as the potential limitation resulting from the AD evaluation, and may be either the ADBAC, the NIL, or may be based on the concentration associated with the threshold load concentration (for the bioaccumulative toxic pollutants). ADBACs, NILs and TLs have already been determined in the AD evaluation, and therefore to complete the evaluation, a final comparison of limitations needs to be completed.

Note that ADBACs and NILs are not applicable when the new WQBEL concentration (and loading as evaluated in the New and Increased Impacts Test) is less than the NIL concentration (and loading), or when the new WQBEL is less than the ADBAC.

Where an ADBAC or NIL applies, the permittee has the final choice between the two limitations. A NIL is applied as a 30-day average (and the acute WQBEL would also apply where applicable) while the ADBAC would be applied as a 2 year rolling average concentration. For the purposes of this WQA, the Division has made an attempt to determine whether the NIL or ADBAC will apply. The end results of this AD evaluation are in Table A-13, including any parameter that was previously exempted from further AD evaluation, with the final potential limitation identified (NIL, WQBEL or ADBAC).

Table A-13

Final Selection of WQBELs, NILs, and ADBACs For the Cortez SD WWTF

Pollutant	*NIL*	*New WQBEL*	*ADBAC*	*Chosen Limit*
E.coli (#/100 ml)	61	259	34	NIL
TRC (mg/l)	0.05	0.026	NA	WQBEL
NH3 as N, Tot (mg/l) Jan	8.34	19	2.9	NIL
NH3 as N, Tot (mg/l) Feb	6.71	18	2.7	NIL
NH3 as N, Tot (mg/l) Mar	3.93	17	2.6	NIL
NH3 as N, Tot (mg/l) Apr	6.71	13.3	2	NIL
NH3 as N, Tot (mg/l) May	6.81	13.2	1.9	NIL
NH3 as N, Tot (mg/l) Jun	4.79	18.5	2.8	NIL
NH3 as N, Tot (mg/l) Jul	3.93	17.8	2.7	NIL
NH3 as N, Tot (mg/l) Aug	2.59	24	3.6	ADBAC
NH3 as N, Tot (mg/l) Sep	2.40	33	5	ADBAC
NH3 as N, Tot (mg/l) Oct	2.01	28	4.2	ADBAC
NH3 as N, Tot (mg/l) Nov	2.68	20	3.2	ADBAC
NH3 as N, Tot (mg/l) Dec	7.57	24	3.6	NIL
As, TR (µg/l)	1	18	2.6	ADBAC
As, Dis (µg/l)	1	453	69	ADBAC
Cd, Dis (µg/l)	0.14	2.9	0.43	ADBAC
Cr+3, TR (µg/l)	2	238	43	ADBAC
Cr+3, Dis (µg/l)	2	549	90	ADBAC
Cr+6, Dis (µg/l)	2	26	11	ADBAC
Cu, Dis (µg/l)	62.5	59	1.2	WQBEL
CN, Free (µg/l)	NA	6.7	1	ADBAC
Fe, TR (µg/l)	125	4001	1579	ADBAC
Pb, Dis (µg/l)	6.8	26	4	NIL
Mn, Dis (µg/l)	15	5745	867	ADBAC
Hg, Tot (µg/l)	0.2	0.024	NA	WQBEL
Ni, Dis (µg/l)	7.3	399	64	ADBAC
Se, Dis (µg/l)	2	6.1	NA	WQBEL
Ag, Dis (µg/l)	0.03	8.3	1.3	ADBAC
Zn, Dis (µg/l)	83	790	70	NIL

For the following parameters, several, the NILs have been established for this facility. The NILs were selected as they are less stringent than the WQBELs and the ADBACs. However, the facility has the final choice between the NILs and ADBACs, and if the ADBAC is preferred, the permit writer should be contacted.

For some parameters, the ADBACs have been established for this facility. The ADBACs were selected as they are less stringent than the WQBELs and the NILs, or perhaps due to the application as a two-year rolling average. However, the facility has the final choice between the NILs and ADBACs, and if the ADBAC is preferred, the permit writer should be contacted.

Alternatives Analysis

If the permittee does not want to accept an effluent limitation that results in no increased impact (NIL) or in insignificant degradation (ADBAC), the applicant may conduct an alternatives analysis (AA). The AA examines alternatives that may result in no degradation or less degradation, and are economically, environmentally, and technologically reasonable. If the proposed activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that development. The result of an AA may be an alternate limitation between the ADBEL and the WQBEL, and therefore the ADBEL would not being applied. This option can be further explored with the Division. See Regulation 31.8 (3)(d), and the Antidegradation Guidance for more information regarding an alternatives analysis.

VIII. Technology Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

According to Part 62.4(2) of the Regulations for Effluent Limitations "If the Commission has not so promulgated effluent limitation guidelines for any particular industry, but that industry is subject to effluent limitation guidelines promulgated by the United States Environmental Protection Agency pursuant to the Federal Water Pollution Control Act of 1972, the effluent from these industries shall be subject to the applicable EPA guidelines and shall not be subject to the effluent limitations of Regulation 62.4." Therefore, the limitation for oil and grease in Regulation 62.5 (10 mg/l) shall not apply to this discharge.

Table A-14a and b contains a summary of the applicable limitations for pollutants of concern at Cortez Sanitation District and VVV facilities, respectively.

Table A-14a

Regulation 62 Based Limitations

Parameter	*30-Day Average*	*7-Day Average*	*Instantaneous Maximum*
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
TSS Percent Removal	85%	NA	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

Table A-14b

Regulation 62 Based Limitations

Parameter	*30-Day Average*	*7-Day Average*	*Instantaneous Maximum*
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, aerated lagoon	75 mg/l	110 mg/l	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective September 30, 2012.

Classifications and Numeric Standards for San Juan River and Dolores River Basins, Regulation No. 34, Colorado Department Public Health and Environment, Water Quality Control Commission, effective 3/30/2013

Colorado River Salinity Standards, Regulation 39, CDPHE, WQCC (last update effective 8/30/97)

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, March 30, 2008.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2012.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the San Juan, Colorado Department Public Health and Environment, Water Quality Control Division, effective September, 2012.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.